NAVAL AIR STATION ALAMEDA'S MATERIAL DISTRIBUTION SYSTEM

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Monterey, California

THESIS

NAVAL AIR STATION ALAMEDA'S
MATERIAL DISTRIBUTION SYSTEM

by

Richard T. Macon

December 1979

Thesis Advisor: A. W. McMasters

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I. INTRODUCTION

Navy Supply Center Oakland assumed the wholesale aviation supply function of Naval Air Station Alameda on 1 October 1979 [1]. NSC Oakland and NAS Alameda are prototype activities in a plan to consolidate and mechanize the wholesale supply functions of collocated Industrial Naval Air Stations (INAS) and Navy Supply Centers (NSC) at Oakland, San Diego, and Norfolk. The implementation of the consolidation plan is based upon the recommendations of the Department of Defense Material Distribution Study (DODMDS)[1].

The DODMDS examined the capacity, operational assets, and transportation costs associated with 34 major DOD wholesale activities. The three-year study was completed in March 1978. Essentially, it determined the number and location of wholesale activities necessary to provide efficient and cost effective distribution of material.

The consolidation is not to downgrade the current supply support to the wholesale customers, the primary one of concern at Alameda is the associated Naval Air Rework Facility [1]. In an effort to determine the current supply support (prior to the consolidation) NSC Oakland, NAS Alameda, NARF Alameda and Naval Station Mare Island were studied. Each of these locations was studied with respect to a variety of areas. Some of these were the customer response times, the costs of material shortage, and the transportation costs.

This thesis presents the results of a study of the material distribution system through which NAS Alameda provided supply support to their customers before the consolidation. The following were the prime objectives of the study:

(1) Define the existing material and document flow to local customers, including distances, times and volume.

(2) Determine the costs, both indirect and direct.

(3) Determine any possible improvements. Primarily reducing the delivery time to the customers and reducing costs.

The detailed results of this study will be presented in Chapter II of this thesis. Chapter III summarizes the results of the study, and draws conclusions.

II. NAVAL AIR STATION ALAMEDA'S MATERIAL DISTRIBUTION SYSTEM

This chapter describes the Material Distribution System at the Naval Air Station Alameda, and is divided into two parts. The first part will deal with defining the system. The second part will discuss the cost of this system. In both of these parts NAS Alameda's System will be divided into the divisions and branches responsible, and these will be discussed separately.

A. DEFINITION OF THE SYSTEM

NAS Alameda's Distribution System will be defined by first describing the organizational structure of NAS Alameda's Supply Department (also referred to as NAS Supply) and of Naval Air Rework Facility Alameda (NARF). The overall material flow processes on the Station will then be presented and discussed. Finally, the actual movement of material between various buildings will be discussed.

1. Organizational Structure

a. Supply Department

NAS Alameda's Supply Department is divided into six divisions. These are the Administrative and Planning Division, the Material Division, the Control Division, the Aviation Support Division, the Food Service Division, and the Fuel Division. Figure 1 shows in more detail NAS's Supply Department Organization. Of these six divisions the

NAS ALAMEDA SUPPLY DEPARTMENT'S ORGANIZATION CHART - APRIL 1979

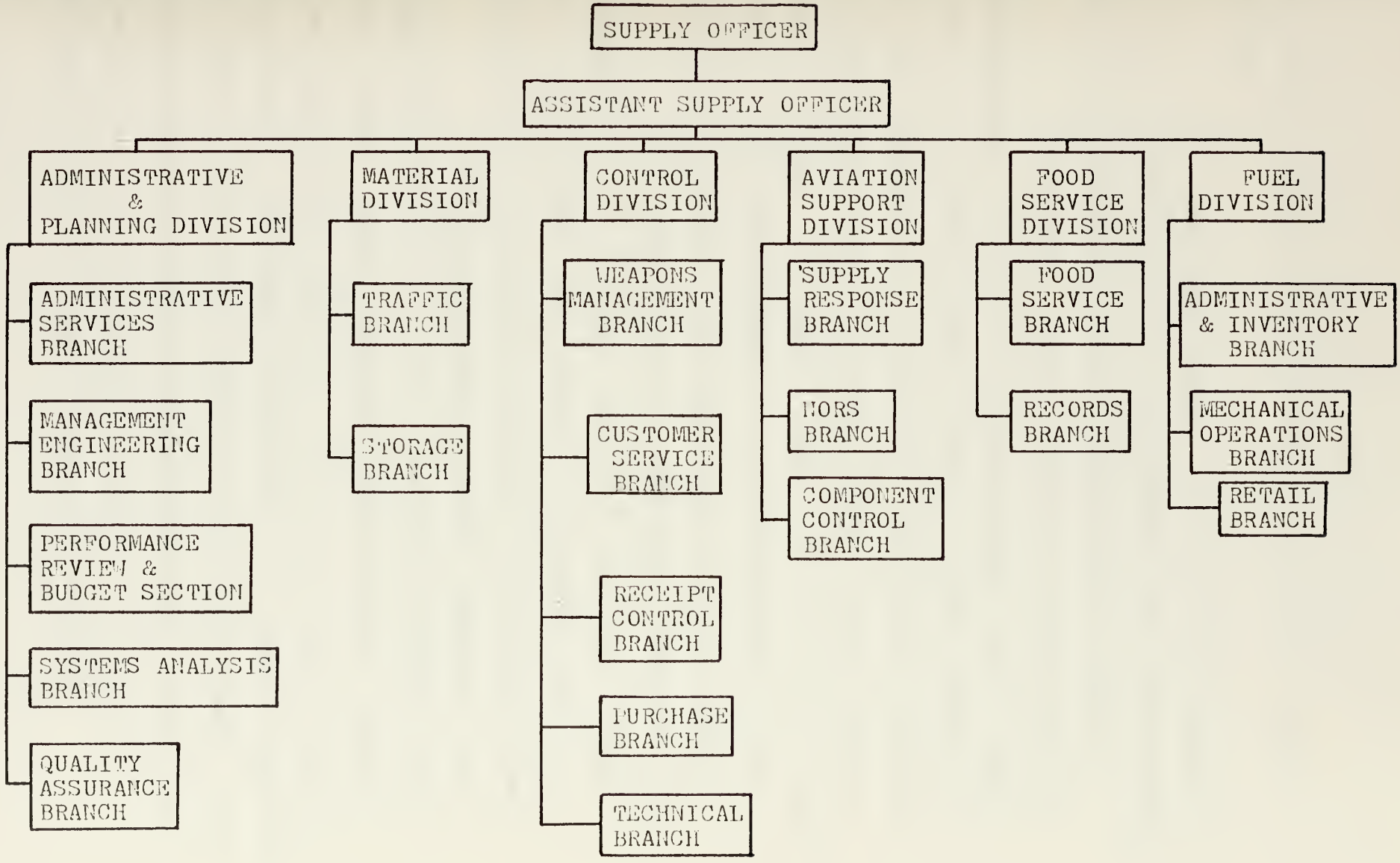


Figure 1

two that are directly involved with NAS's Material Distribution System are the Material and Aviation Support Divisions.

The Material Division consists of two branches; the Traffic Branch and the Storage Branch. An organizational chart of the Material Division is presented in Figure 2.

The Traffic Branch is basically responsible for receiving and sorting all incoming material and for transporting all Navy Supply Issue Group II and III material to the local customers on the station. Issue Group I material is transported by both the Traffic Branch and the Aviation Support Division. The Traffic Branch and the Aviation Support Division. The Traffic Branch is also responsible for the packing and shipping of materials leaving the air station.

The Storage Branch is basically responsible for the storage of all materials stocked by the Supply Department. This includes the placement of material into the warehouses and the picking of material from the warehouses.

The Aviation Support Division consists of the Supply Response Branch, the Not Operationally Ready Supply (NORS) Branch, and the Component Control Branch. Figure 3 is an organizational chart for the Aviation Support Division. This division is basically responsible for directly supporting the aviation units while they are on board NAS Alameda. This involves many operations from expediting supply requisitions to monitoring a component repair program. The function most directly involved with the Station's material

MATERIAL DIVISION'S ORGANIZATION CHART
SUPPLY DEPARTMENT - APRIL 1979

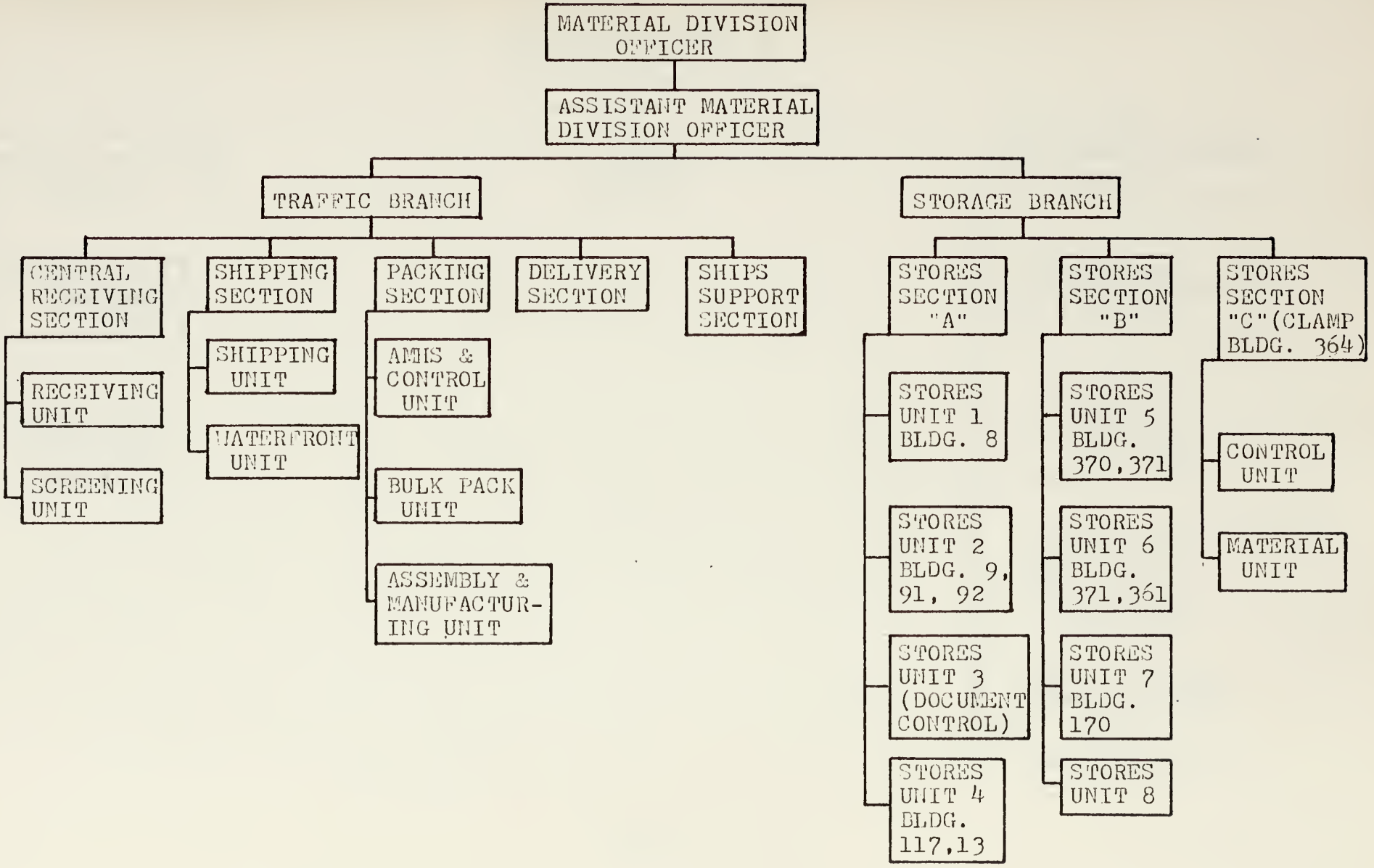


Figure 2

TABLE VIII

SUMMARY OF DELIVERY SECTION'S SEMI-TRAILER SPOTS

36 Working Days Ending 30 April

Spot Location Building Number	Quantity		Percent of Total	
5	6		7.6	
9	4		5.1	
11	9		11.4	
12	2		2.5	
13	1		1.3	
22	1		1.3	
23	3		3.8	
39	1		1.3	
168	3		3.8	
170	3		3.8	
270	2		2.5	
364	11		13.9	
368-B	1		1.3	
368-D	23		29.1	
368-E	2	29	2.5	36.7
368(Section not noted)	3		3.8	
369	3		3.8	
400	1		1.3	
TOTAL	79			

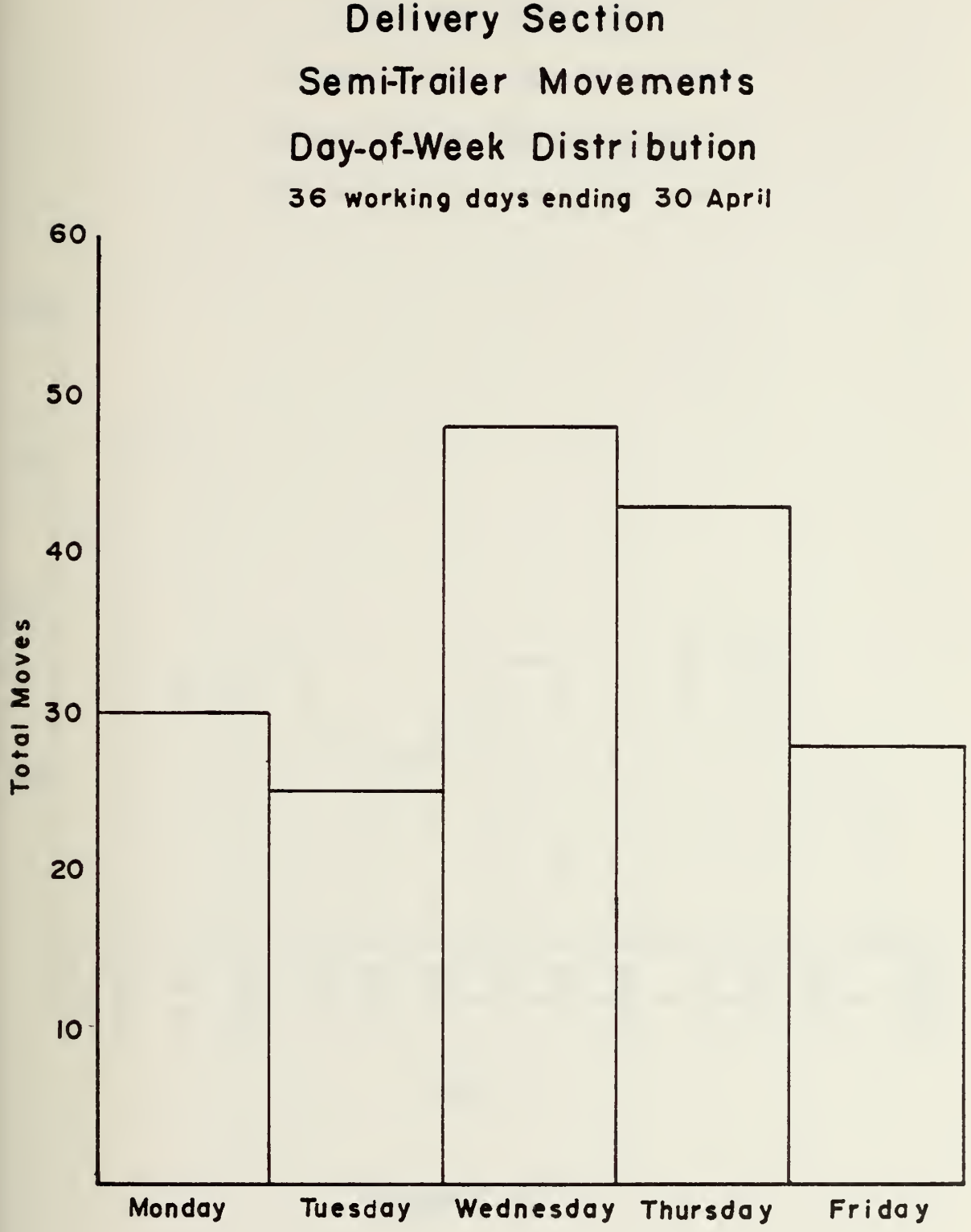

Delivery Section
Semi-Trailer Movements
Day-of-Week Distribution
36 working days ending 30 April
60
50
40
30
20
10
Total Moves
Monday
Tuesday
Wednesday
Thursday
Friday

Figure 16

Delivery Section

Semi-Trailer Movements

Time-of-Day Distribution

36 working days ending 30 April

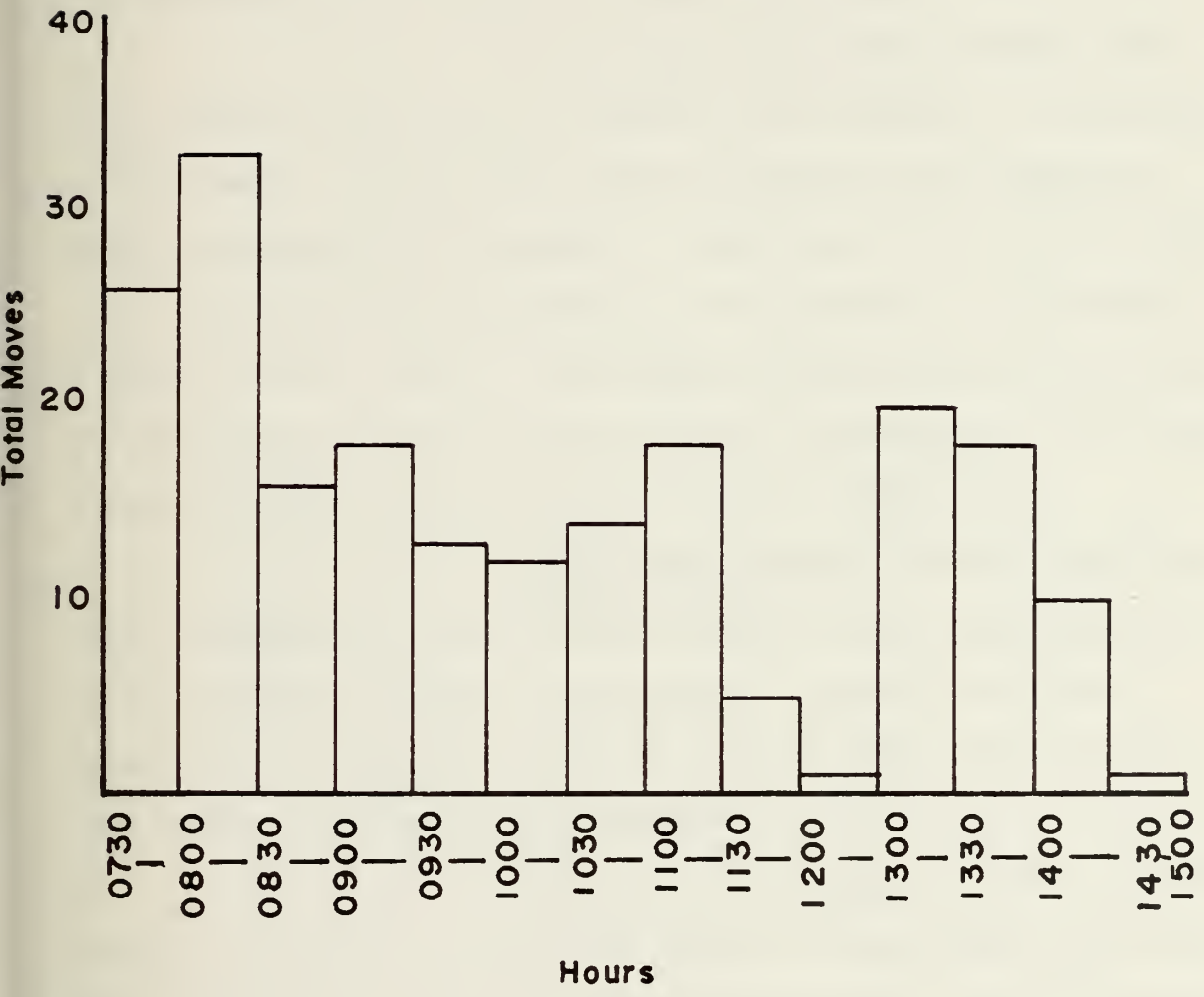


Figure 17

spots. Of these spots, 36.7 percent were at building 368, with the majority at the Delivery Section (section D). The Delivery Section uses these semi-trailers to deliver items too large for their two-ton stake trucks. Also, the trailers are used to deliver batches of material which are bound for one customer and are too many in number for one two-ton truck to handle [12]. No information was available to determine the portion for these two uses.

From Figure 16 it can be seen that the number of semi-trailer moves is the highest on Wednesday and Thursday. During the rest of the week the number of moves is relatively constant. From Figure 17 it can be seen that the demand for trailers is the greatest in the early morning (before 0830). The demand remains relatively constant for the rest of the day with the two exceptions of just before lunch time and quitting time, then the demand dies.

Truck Utilization. Before departing this discussion of the Delivery Section the utilization of their vehicles should be discussed. Since no data was available for the semi-trailer or forklifts, only the two-ton stake trucks will be discussed.

Table IX is a summary of the two-ton truck utilization. From this table it can be seen that the mean utilization is only 4.87 hours per day. This is based on ten trucks. There are two reasons why this figure might be low. The first is that the lower utilized trucks were actually down but counted as usable. Trucks that are down

TABLE IX

DELIVERY SECTION
TWO-TON STAKE TRUCK UTILIZATION
FOR THE MONTH OF APRIL

Truck No. (1)	No. of Runs	Utilization hrs/day	Total Miles Driven (2)
825	67	5.8	235
781	89	3.5	495
822	77	2.9	303
819	142	3.9	433
814	93	2.5	249
812	48	5.1	257
826	30	7.5	585
837	27	8.3	574
424	24	6.4	640
435	15	2.8	441

Mean - 4.87 hrs/day = 421.2 miles/month

Sample Standard Deviation = 2.07 hrs/day = 152.6 miles/month

NOTES: (1) These are only the last 3 digits of the USN Number.

(2) Reference 18.

less than 72 hours at a time are considered usable. Unfortunately, no permanent records was kept of down time [13]. The second reason could be that ten trucks are not needed to handle the volume.

Of course, this low utilization could be caused by April possibly having been a slow month [12]. Unfortunately, because of the delay in recording on the Demand History File (the data base for Appendix A's monthly demands history), it could not be determined if April was indeed slow.

(2) Aviation Support Division. The Material Delivery Section is responsible for transporting material for the Aviation Support Division.

According to a memo [14] by Mr. Vranich, the Supply Response Branch Head,

> The main concern of the delivery section is to meet one (1) and two (2) hour time frames on all issues including OSI, RCA pool, and expeditious repair, this includes all priority 03 AWP (awaiting parts) requests. The above requirements will take preference over any other requirements.

This statement sums up the attitude and requirements of ASD's delivery section.

To accomplish this two pickup trucks, two vans and 2 two-ton stake trucks are used. As of 4 May 1979, the delivery section had only five of the six allowed drivers (including the supervisor). Each driver carries a walkie-talkie for communication with the supervisor in building 41.

Four routes have been established. These are:

- Mail pickup and delivery for all ASD offices. This is to be done at least twice daily, once in the morning and once in the afternoon.

- NORS and NSC Oakland run. This includes the pickup of Issue Group I material from the Receiving Section in building 368, section A, and its delivery. Also, runs are made to NSC Oakland for urgent material. This is to be done at least twice daily; once in the morning and once in the afternoon. However, the portion to NSC Oakland is not always made twice each day.

- Delivery from building 41 to buildings 11, 368, 117, 170, and salvage. This is done on a continuous basis all day long.

- Pickup and deliver material from each warehouse issue station. Also, pickup all retrograde material and deliver it to building 41. This is done the first thing in the morning[14].

With two drivers committed all day for the NORS and NSC Oakland run, and building 41 to buildings 11, 368, 117, 170 and salvage run. The remaining three drivers respond directly to the squadrons' material requisitions. Of course the NSC Oakland run should always be in response to a squadron requisition.

To see what these three drivers do, their logs were studied in a way similar to the Material Division logs. A page from these logs is in Appendix D-7. For

volume considerations each line entry in this log can be considered as one piece of material [6]. So the number of runs to a building is equivalent to the volume delivered there. A period of 13 working days ending on 7 March 1979, which contained 205 runs was used for this analysis.

Table X summarize the movements of the three drivers based on their logs. It contains a summary of the delivery times, one way, to each of the buildings served by ASD and a summary of warehouse service times associated with these ASD deliveries. Review of this table shows that the average delivery times exceed the Naval Aviation Maintenance Program's [8] for one hour delivery for Issue Group I in six of the nine cases. However, the Issue Group II requirement of two hours was met in all nine cases. (This includes the average computer response time of 45.3 minutes [4]). Finally, the time spent waiting in the warehouse for a part is only 12 percent, on the average, of the overall delivery time.

Figures 18, 19, and 20 gives the volume distributions with respect to warehouse, time-of-day and day-of-week, respectively. From Figure 18 it can be seen that building 8 and 371 supply 68.7 percent of the materials to the squadrons. From Figures 19 and 20 it can be seen that the volume is greatest on Thursday. Also, the work load peaks between 0800 to 0900 and 1000 and 1100 [14].

TABLE X

AVIATION SUPPORT DIVISION'S
MOVEMENTS

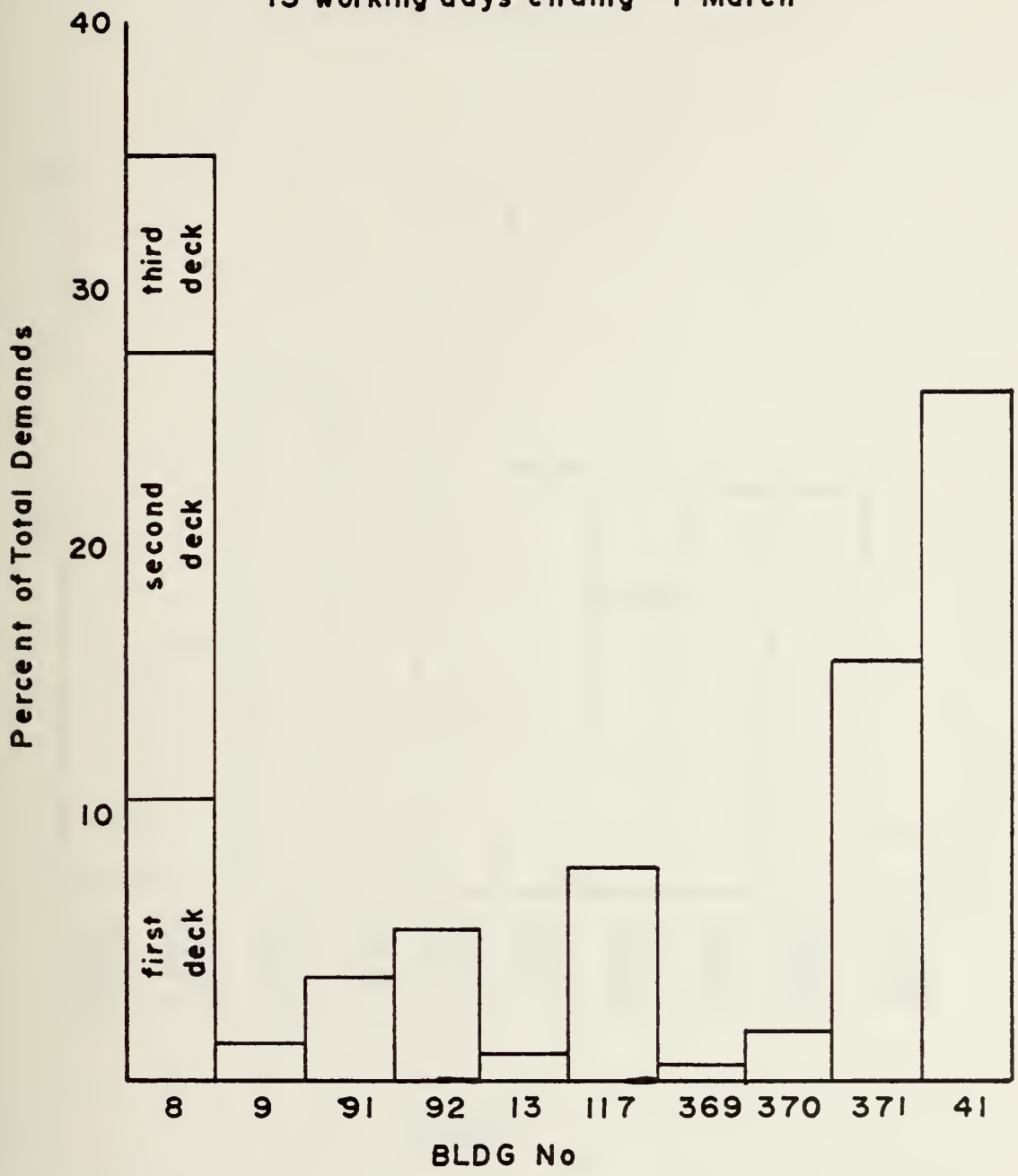
13 Working Days Ending 7 March

BLDG. No.	No. of Runs	TIME (mins)		
		Avg(1)	Sample Stand. Dev.	Range
41	115	2.4	20.73	4-76
Piers	10	41.8	15.05	4-51
23	11	13.9	16.28	5-40
21	28	23.5	18.82	5-66
22	16	12.9	12.82	4-35
39	5	20.2	5.02	15-25
40	9	25.2	21.9	5-70
20	10	16.7	16.67	5-56
22	1	55.0	---	---
Subtotal	205	27.8		
Warehouses		(2)		
8	120	2.7	8.42	2-31
92	21	3.8	3.77	4-70
117	15	5.9	2.20	4-10
91	6	8.7	5.68	5-56
13	1	5.0	--	--
Subtotal	164(3)	3.4		

NOTES: (1) Average Delivery Times - Time from departing BLDG 41 until the time material is delivered.

(2) Average Warehouse Service Time - Time from arrival until departure at a warehouse (included in Average Delivery Time).

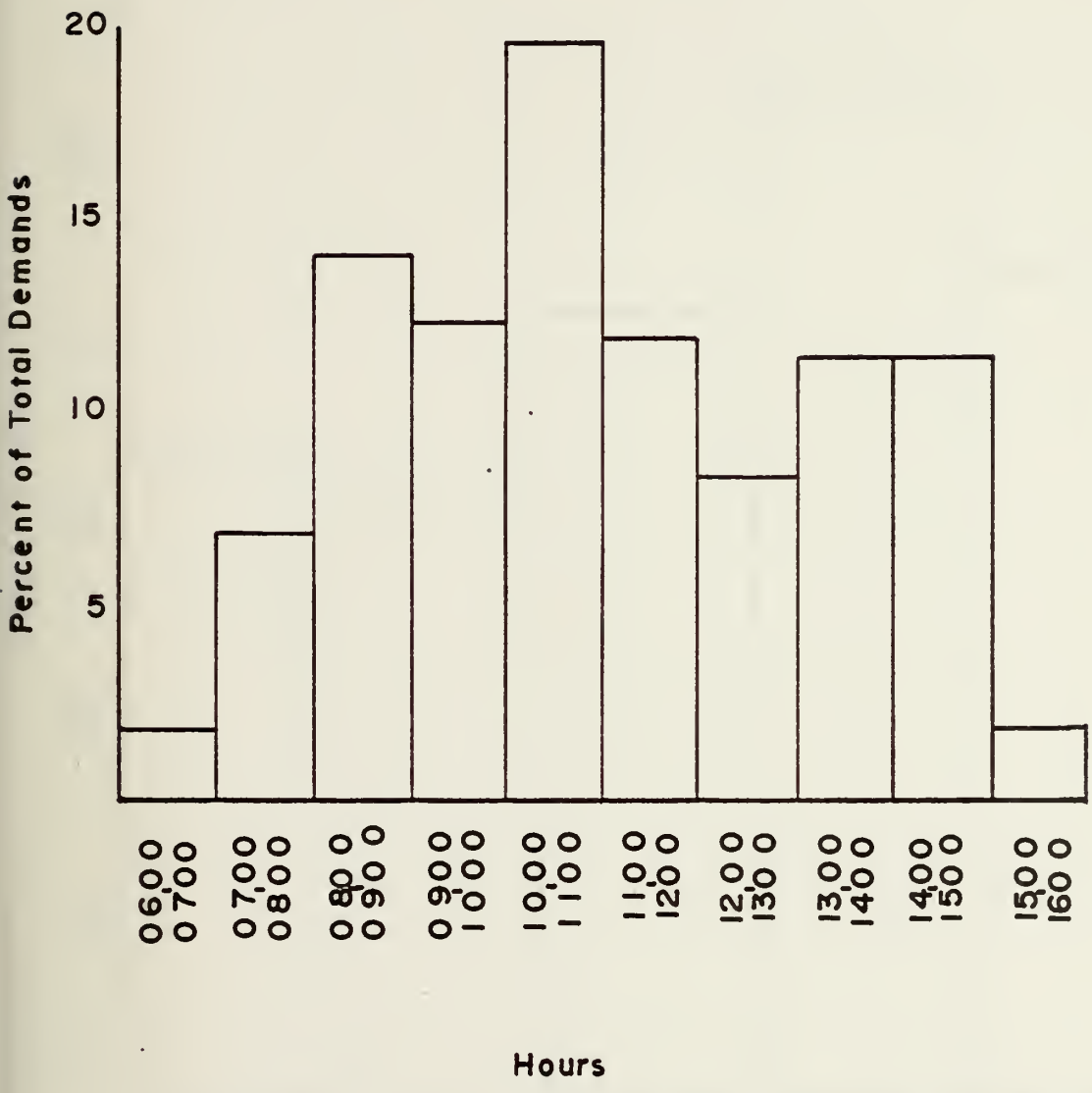
(3) 205 runs were made but not all of the warehouse times were recorded.



Ref. 4

Figure 18

Aviation Support Division
Time-of-Day Distribution
13 working days ending 7 March



Ref. 4

Figure 19

Aviation Support Division

Day-of-Week Distribution

13 working days ending 7 March

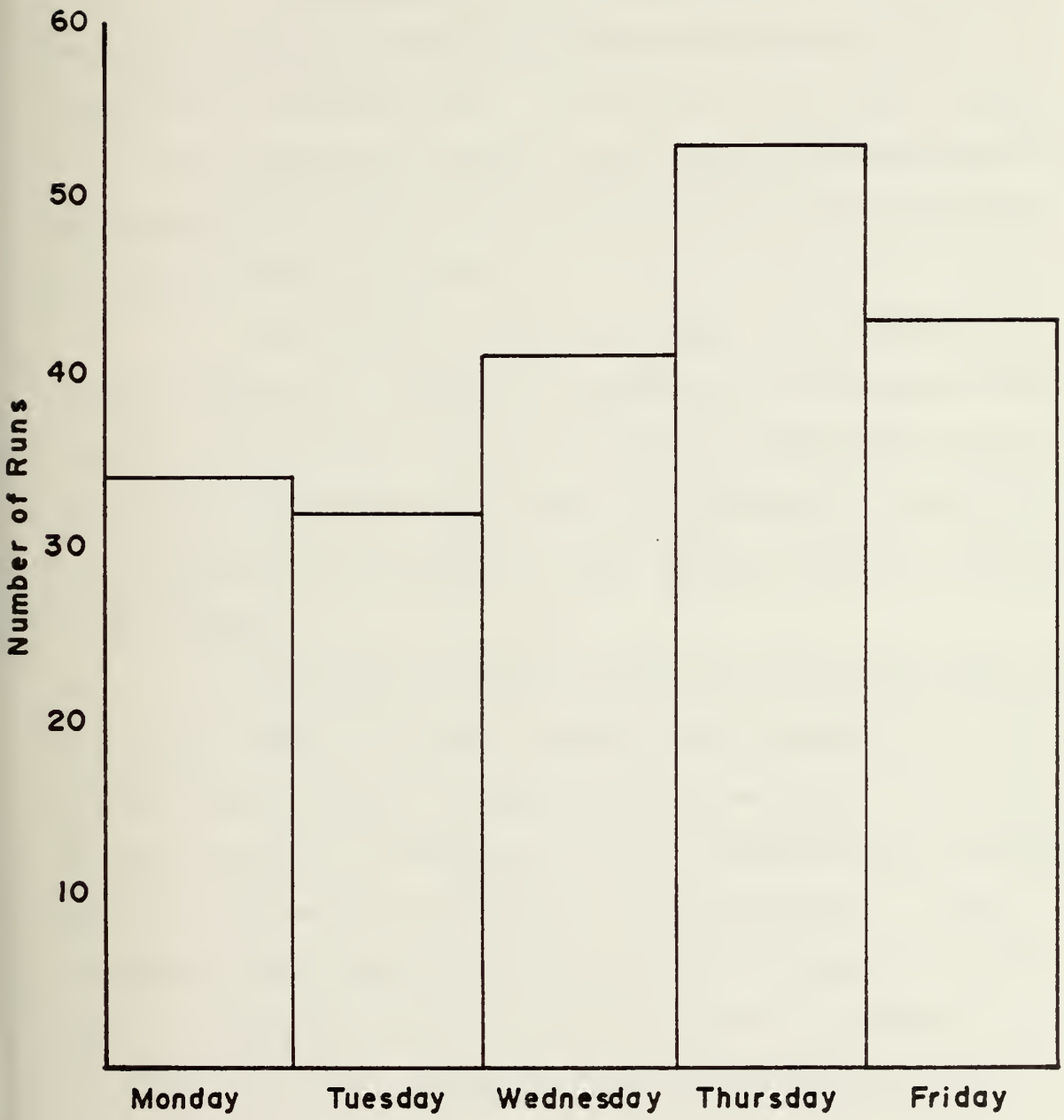


Figure 20

b. NARF's Transportation Branch

NARF's Transportation Branch transports materials with a variety of equipment. This branch transports both internal material (between NARF shops) and material coming from NAS Supply and other locations.

To accomplish this transportation, 40 vehicles are radio equipped, and can be radio dispatched by a dispatcher in building 500. In addition, two mule trains, one running clockwise and the other running counterclockwise, carry material within the centrally located NARF buildings (5, 12, 11, 400, 39 and 44).

The rest of NARF's more than 100 vehicles transport material simply by stopping at an internal route location and looking at the Route Slip (12ND NARFA 4615/2: Rev. 9-73), then moving it where the slip says to move it. No set pattern is required of each vehicle, and no monitoring is done [15].

In order to study the flow of incoming materials around the NARF, a log was drafted and distributed to the drivers most likely to handle incoming material. The intent of this log was to determine the time required for incoming material to reach the internal route locations. It was recognized that some of the data obtained would not be for incoming material; but, it would still help determine the desired times. A page of this log is included in Appendix D-8.

From Table XI it can be seen that the overall average time spent at an internal route location is 11.0 minutes and the overall average time spent traveling to an internal route location is 8.6 minutes. The overall average stop time for a building is 12.8 minutes, with an overall average of 16.5 minutes spent traveling to it. It is interesting to note that 72 of 239 runs (30.1 percent) were to NAS Supply warehouses.

From Table XII it can be seen that buildings 5 (NARF's main building) and 400 (NARF's power plants building) see the most volume. Also, the volume passing through each MCC is relatively even.

B. COSTS

The operating cost will be the focus of NAS Alameda's Material Distribution System cost study. The costs that will be discussed are the vehicle operation and maintenance costs, the personnel costs (both supervisory and direct labor) and the costs associated with the occupation of storage and staging spaces. Not all of these will be presented for all of the divisions because they were not available. The costs associated with the NAS Alameda Supply Department will be discussed first, with NARF's costs to follow.

1. NAS Supply Department Costs

The quantified costs associated with the NAS Supply Department involved truck rental charges, Material Handling Equipment (MHE) costs, and personnel costs. Also, an

TABLE XI

SUMMARY OF NARF'S MOVEMENTS

(22 to 26 October 1979)

Stop Location	QTY	STOP TIME (mins)			TRANSIT TIME (mins)		
		AVG	Standard Deviation	Range	AVG	Standard Deviation	Range
25	4	12.5	2.5	10-45	17.5	16.39	5-45
53	3	5.3	0.94	4-6	2.0	--	--
55	3	6.7	0.47	6-7	8.7	0.47	8-9
58	3	10.3	3.30	8-15	8.7	0.94	8-10
59	3	3.3	0.94	2-4	2.0	--	--
60	3	4.3	0.47	4-5	1.0	--	--
63	3	10.0	5.66	2-14	3.0	1.41	1-4
66	9	5.7	5.90	1-16	7.3	3.71	4-11
68	4	6.8	0.43	6-7	4.0	--	--
70	3	7.6	0.02	2-11	5.1	2.18	2-7
72	2	5.0	--	--	5.0	--	--
73	2	7.5	0.5	7-8	30.0	--	--
74	3	12.0	1.41	10-13	12.0	5.66	8-20
77	5	6.4	3.14	1-10	7.8	2.71	5-12
79	3	8.7	0.94	8-10	11.7	0.94	8-13
81	3	3.3	0.94	2-4	3.3	0.94	2-4
83	2	2.0	--	--	1.3	0.0	1-2
89	3	3.3	0.94	2-4	3.3	0.94	2-4
A2	3	18.3	2.36	2-20	13.3	2.36	10-15
A3	4	18.8	6.50	15-30	20.0	5.0	15-25
BA	6	5.17	2.34	1-9	19.2	11.99	4-35
B2	5	14.0	4.90	5-20	15.0	3.16	15-20

TABLE XI (continued)

Stop Location	QTY	STOP TIME (mins) AVG	Standard Deviation	Range	TRANSIT TIME (mins) AVG	Standard Deviation	Range
D7	2	10.0	1.0	9-11	5.0	--	--
E4	8	21.3	9.92	10-25	21.0	16.34	5-60
E7	6	22.3	7.54	15-37	25.5	12.37	10-40
U2	7	19.7	0.40	8-45	11.0	0.02	2-15
U7	5	15.0	3.16	10-20	8.0	5.10	5-15
Subtotal	107	11.0			8.6		
Building Number							
5	2	20.0	15.0	5-35	44.0	14.0	30-58
8 *	12	20.8	11.87	5-47	60.0	13.1	5-60
14	7	4.9	2.42	3-9	6.1	3.23	1-10
40	2	4.0	1.0	3-5	5	--	--
162 *	10	8.5	6.58	2-25	10.4	8.27	2-30
163 *	5	2.6	1.20	1-4	5.4	3.61	1-10
167 *	7	10.3	4.68	5-15	4.1	1.00	3-5
261	3	2.0	0.82	1-3	2.0	0.82	1-3
360 *	24	16.8	8.26	5-40	19.2	10.89	2-55
368 *	14	17.7	9.68	2-35	12.4	8.33	1-35
398	7	9.1	5.25	5-20	13.3	12.19	1-40
400	11	17.5	7.75	2-30	10.9	7.75	3-45
500	10	12.2	10.01	2-30	7.5	5.20	3-16
530	5	8.2	6.05	3-20	3.0	--	--
Subtotal	132	12.8			16.5		
TOTAL	239						

*NAS Alameda Supply Department warehouses

TABLE XII

NARF'S VOLUME DISTRIBUTION WITH RESPECT TO INTERNAL ROUTE LOCATIONS APRIL 1979

Total Number	% of Total	Internal Route Location	Building No.	MCC
179	9.072	--	5	A
2	.101	J2	FARM	A
6	.304	80	170	L
43	2.179	77	162	L
203	10.288	--	400	F
--	--	C7	44	A
--	--	C8	42	A
2	.101	J3	163	L
16	.811	J1	338	A
1	.051	--	62	A
57	2.889	B7	5	A
16	.811	C6	5	A
16	.811	D6	5	A
14	.710	D2	5	A
--	--	D3	5	A
--	--	D4	5	A
14	.710	A2	5	A
--	--	58	5	A
--	--	H1	410	L
3	.152	C3	5	A
--	--	E2	5	A
10	.507	G1	11	F
23	1.166	M1	167	L
--	--	B4	5	A
33	1.673	D1	5	A
3	.153	C5	5	A
4	.203	A4	5	A
22	1.115	F1	12	F
71	3.599	R1	400	F
--	--	E9	5	A
--	--	B8	5	A
9	.456	E6	5	A
26	1.318	E7	5	A
20	1.014	F2	12	F
172	8.718	41	400	F
226	11.455	43	400	F
9	.456	13	11	F
--	--	51	5	A
62	3.142	25	5	A
--	--	K2	11	F
5	.253	B9	5	A
--	--	E5	5	A
29	1.47	B2	5	A

TABLE XII (continued)

Total Number	% of Total	Internal Route Location	Building No.	MCC
8	.405	B6	5	A
63	2.28	E4	5	A
13	.659	B5	5	A
4	.203	C2	5	A
37	1.876	--	360	L
156	7.947	--	170	L
7	.355	D7	5	A
9	.456	F3	12	F
13	.159	8E	5	A
4	.207	71	360	L
6	.311	65	360	L
25	1.296	73	360	L
32	1.659	60	360	L
1	.051	55	360	L
20	1.037	06	530	L
159	8.244	42	400	F
18	.933	57	14	L
6	.312	82	360	L
--	--	75	162	L
17	.881	07	167	L
28	1.452	79	66	L
38	1.97	64	398	L
2	.101	81	360	L
7	.363	89	360	L
Total 1973	100.0			

MCC	Volume	% Total
A	601	30.46
F	786	39.84
L	586	29.7
Totals	1973	100.0

NOTES: (1) Where no internal route location is specified the MCC serves as the internal route location.

(2) Data obtained from a history file of requisitions during April 1979 collected by LCDR P. Benefeild.

estimate was made of the cost of occupying storage and staging occupied space. Truck rental charges are the cost to the Supply Department for the rental of street type vehicles from the Public Works Center at San Francisco. These charges include a monthly rental charge and a mileage charge. In essence, these charges include all the maintenance and operating costs (except drivers) for these vehicles. Table XIII summarizes these monthly rental charges for class B and C rentals. A Class B rental vehicle is rented on a permanent basis. A Class C rental vehicle is rented on a day-to-day as needed basis.

The costs related to the material handling equipment (mainly forklift trucks) which were obtainable were mostly maintenance costs since the operation costs for this type of equipment was not available. Table XIV contains a summary of the available MHE costs.

An interesting sidelight is that NAS Supply's MHE maintenance is contracted from a private company through the Government Services Agency (GSA). The Public Works Center has the capability and capacity to perform the maintenance, however, contracting this service has proved to be both less costly and to provide higher quality repairs [16].

The personnel costs associated with the Supply Department are presented in Table XV. These costs include the supervisors as well as the direct labor. The direct labor costs include forklift drivers, truck drivers, and warehouse men.

TABLE XIII

SUMMARY OF SUPPLY DEPARTMENT'S PUBLIC WORKS VEHICLE CHARGES
Based on Charges in April 1979

Vehicle Type	Total No. of Class B (1)	Branch/ Division	Number	Monthly Rate Chrg. ($) (1)	Mileage Charge ($) (1)	Avg Mileage (miles) (2)	Total Monthly Charge ($)
Two-Ton Stake Truck	18	Traffic	13	$142	.123	346	2,399
		Storage	2				369
		ASD	1				185
		Subtotal	16				2,953
1/2 Ton Pickup	9	ASD	2	83	.079	468	240
Truck multi stop (van)	2	ASD	2	98	.079	345	251
						Total	3,443
Average monthly semi-trailer costs (2)							8,129
Average Class C charges (Supply Dept.) $4027 (2)							
Allocated to the Transportation System (3)							951
						Total	$12,523

NOTES: (1) Reference 16
(2) Reference 18
(3) Roughly 23.6% should be allocated
23.6% = 3443 Transportation System Class B / 14582 total monthly Class B

Total yearly costs $150,280

TABLE XIV

SUMMARY OF SUPPLY DEPARTMENT'S MATERIAL HANDLING EQUIPMENT COSTS
1 Jan 78 to 31 Sept 78 Ref. 19

Type Equipment	Total Number Supply	Number	Branch/ Division	Repair Costs $	Yearly Operations Hours
Warehouse tow tractor (mule)	12	3	Receiving & Screening	2,436	414
		1	Delivery	811	468
		2	Storage	1,105	500
	Subtotal	6		3,247	1,382
	Average per month $60.13				153.6 hrs/month per vehicle
Fork Lift Trucks (all types and capacities)	12	8	Receiving & Screening	5,522	2,093
		4	Delivery	2,761	1,047
		5	Packing	3,451	1,308
		18	Storage I (1)	12,425	4,710
		9	Storage II(2)	6,212	2,355
		10	StorageIII(3)	6,902	2,617
		22	Storage Annex (4)	15,186	5,756
		1	ASD	68	262
	TOTALS	77		53,149 $/month	29.1 hrs/month

TABLE XIV (continued)

Average per unit 76.69 $/month 29.1 hrs/month

NOTES: (1) Storage (I) buildings 8, 9, 91, 92
(2) Storage (II) buildings 13, 117
(3) Storage (III) buildings 168, 169, 170, Engine Lot
(4) Storage (Annex) buildings 361, 364, 369,370, 371, Drum Lot

Type Equipment	Total Number Supply	Number	Branch/ Division	Repair Costs $	Yearly Operations Hours
Industrial Flat bed truck (Gasoline)	15	2	Receiving & Screening	1,253	261
		1	Storage(Annex)	626	130
		1	ASD	626	130
	TOTALS	6		3,759	783
Average per unit 69.61 $/month 14.5 hrs/month					
Industrial Flat bed truck (Electric)	3	2	Storage (I)	1,797	263
	TOTALS	2		1,797	263
Average per unit $99.83/month 14.6 hrs/month					

Total Monthly Cost = $7,064

Total Yearly Cost = $84,763

TABLE XV

SUPPLY DEPARTMENT'S PERSONNEL COSTS
Estimated for the Year of 1979

Job Title	Grade	Qty	Total Pay ($/hr)
MATERIAL DIVISION			
Material Control Officer	LCDR	1	20,832
Clerk Typist	GS-4	1	11,054
	Subtotal	2	31,886
TRAFFIC BRANCH			
Traffic Manager	GS-13	1	32,312
RECEIVING SECTION			
General Foreman	WS-10	1	26,395
Inspector (Gen. Equip.)	WG-7	2	35,817.6
Shipment Clerk	GS-6	1	13,785
" "	GS-5	1	12,368
Clerk Typist	GS-3	1	9,846
Warehouseman Foreman	WS-6	2	46,425.6
Warehouseman Leader	WL-5	11	197,454.4
Warehouseman	WG-8	24	448,780.8
"	WG-5	1	16,307.2
Forklift Operation	WG-5	1	16,307.2
Warehouseman	WG-4	4	62,067.2
Laborer	WG-3	1	19,705.6
	Subtotal	49	900,259.6
SCREENING SECTION			
Foreman	WS-6	1	23,259.6
Material Sorter & Identifier	WG-6	5	85,592
Warehouseman Leader	WL-5	1	17,950.4
Warehouseman	WG-5	4	65,223.8
Forklift Operator	WG-5	1	16,307.2
Supply Clerk	GS-3	1	9,846
	Subtotal	13	218,137.2
SHIPPING SECTION			
Supervisor	GS-11	1	22,672
Warehouse Foreman	WS-4	1	21,611.2
Warehouseman	WG-6	3	51,355.2
"	WG-5	2	32,614.4
"	WG-4	1	15,516.8
Traffic Management Specialist	GS-8	1	16,965

TABLE XV (continued)

Job Title	Grade	Qty	Total Pay ($/hr)
Shipment Clerk	GS-7	1	15,317
" "	GS-5	3	37,104
" "	GS-4	1	11,054
Flexowriter Operator	GS-4	4	44,216
Supply Clerk	GS-4	1	11,054
Clerk Typist	GS-3	2	10,692
" "	GS-2	1	8,902
	Subtotal	22	308,073.6
PACKING SECTION			
General Foreman	WS-11	1	26,728
Clerk Typist	GS-3	1	9,846
Packer Foreman	WS-6	1	23,212.8
" Leader	WL-6	1	13,824
Packer	WG-6	22	428,771.2
Warehouseman	WG-6	1	19,489.6
Blocker & Bracer Foreman	WS-8	2	49,587.2
Blocker & Bracer	WG-8	13	243,089.6
Woodworker	WG-8	1	18,699.2
"	WG-7	1	17,908.8
Forklift Operator	WG-5	1	16,307.2
Warehouseman	WG-5	1	16,307.2
"	WG-4	2	31,033.6
	Subtotal	48	919,804.4
DELIVERY SECTION			
Foreman	WS-6	1	23,212.8
Motor Vehicle Operator	WG-6	10	171,134.0
Warehouseman	WG-5	3	48,921.6
Clerk Typist	GS-2	1	8,902.0
	Subtotal	15	252,220.4
SHIPS SUPPORT SECTION			
Foreman	WS-11	1	26,728
Leader	WL-10	1	22,318.4
Crane Operator	WG-11	5	105,456
Rigger	WG-10	7	142,105.6
Rigger Worker	WG-5	1	16,307.2
	Subtotal	15	312,915.2
STORAGE BRANCH			
General Foreman	WS-9	1	25,584
Warehouseman Foreman	WS-6	3	69,638.4
Warehouseman Leader	WL-5	13	233,355.2
Warehouseman	WG-6	2	34,236.8
Motor Vehicle Operator	WG-6	2	34,235.8
Warehouseman	WG-5	30	489,216

TABLE XV (continued)

Job Title	Grade	Qty	Total Pay ($/hr)
Laborer	WG-3	2	29,411.2
Supervisor Supply Clerk	GS-7	1	15,317
Supply Clerk	GS-5	1	12,368
" "	GS-4	1	11,054
" "	GS-3	3	29,538
Clerk Typist	GS-2	1	8,902
	Subtotal	63	992,857.4
	STORES SECTION B		
General Foreman	WS-9	1	25,584
Warehouseman Foreman	WS-6	4	92,851.2
Warehouseman Leader	WL-5	11	197,454.4
Warehouseman	WG-6	4	68,473.6
Warehouseman	WG-5	30	489,216
"	WG-4	5	77,584
Laborer	WG-3	1	14,705.6
Clerk Typist	GS-2	2	17,804
	Subtotal	58	983,672.8
	AVIATION SUPPORT DIVISION		
Supervisor	WL-5	1	17,950
Drivers	WG-4	3	46,550
	Subtotal	4	64,550
	TOTAL	291	$4,727,090/yr
			$ 393,924/month

Reference 20

NOTE: No step information was available so these figures are for the intermediate steps.
WG,L,S Step 3
GS Step 4

From Tables XII, XIV and XV it can be seen that the total monthly cost for equipment is about $20,000 while the total monthly personnel costs are roughly $400,000. A summary table of these costs are presented in Chapter III.

Table XVI presents the various building sizes associated with the Material Division. Because these buildings are used almost totally for the storage and staging of material, their sizes can be directly related to the cost of occupying space for storage and staging. Unfortunately, the actual costs of operating and maintaining these buildings were not available.

For the Aviation Support Division building size is not a good measure of these costs. The buildings which contain storage and staging spaces are used for much more, and the storage and staging spaces are only a very small percentage of the total building space. No good measure of the cost of occupying space for storage and staging was found for these two organizations.

2. NARF's Distribution Costs

The costs that can be associated with NARF's distribution of material are street vehicle rental costs, material handling equipment costs, and personnel costs. The costs associated with the spaces used for staging and storing material could not be identified. This space is small relative to the total space.

The definitions of street vehicle rental costs, material handling equipment costs and personnel costs are the

TABLE XVI

LIST OF SUPPLY DEPARTMENT'S WAREHOUSE SIZES
April 1979

Building No.	Size (ft)	Use
8	422 x 211 per floor (3 floors)	Storage & Offices
9	845 x 211	Storage
91	475 x 211	Storage
92	633 x 158	Storage
117	581 x 316	Storage
168	713 x 264	Storage
169	528 x 264	Storage
170	528 x 264	Storage
361	924 x 264	Storage
364	343 x 317	Staging & Storage
368	1320 x 264	Staging
369	1056 x 264	Storage
370	1320 x 264	Storage
371	1320 x 264	Storage

same as they were for NAS Supply Department. Tables XVII, XVIII, and XIX present summaries of these costs respectively.

From these tables it can be seen that the equipment costs for NARF's Transportation Branch are $49,200 per month and the personnel costs are $22,072 per month. This is a total annual expenditure of $855,264. It must be remembered that not all of this cost can be contributed toward the movement of material into the NARF. In fact, according to Mr. R. Gums [15], only about 10 percent ($86,000) of this cost can be contributed to the movement of incoming material to the internal route locations. The remainder should be contributed to the internal movement between shops.

From Table XVIII it can be seen that the overall utilization for MHE is 21.5 percent. This seems very good based on the ideal utilization of 24 percent (173 working hours per month/720 total hours per month). In short, the 21.5 percent utilization means that the engine is running 7.2 hours a day. However, the data used to determine utilization is based on a meter which measures engine operating time. Unfortunately, no determination can be made of how productive the equipment is because it could be idle even though the engine is running.

TABLE XVII

SUMMARY OF NARF'S PUBLIC WORKS VEHICLE CHARGES
Based on April 1979 Ref. 22

Class B rental charges	35 vehicles	$ 6,713 per month
Class C rental charges		$11,446 per month
	Total	$18,159

Ref. 21

TABLE XVIII

NARF'S MATERIAL HANDLING EQUIPMENT COSTS
1 October 1978 to 31 September 1979

Type Equipment	Total Number	Average Repair Cost Per Unit	Average Utilization (%)	Average Cost per Unit ($/month)
Tow Tractor	35	423	24.6	35.26
Warehouse Cranes	6	309	16.0	25.71
Forklifts				
(Gasoline)	56	159	27.3	13.26
(Diesel)	3	1542	35.0	128.47
(Electric)	32	407	18.5	33.92
All Types	91	2108	24.5	175.65
Industrial Flat Bed Trucks				
(Gasoline)	19	369	9.0	30.79
(Electric)	9	387	12.9	32.29
All Types	28	757	10.3	63.08
Electric Pallet Jacks	11	9.18	25.0	0.77
Totals	130	2874	21.5	239.50

Total Cost per year = $373,623

Total Cost per month = $31,135

TABLE XIX

TRANSPORTATION BRANCH'S PERSONNEL COSTS, NARF
September 1979 Ref. 17

Job Title	Quantity	Grade	Total Cost($/hr)
General Foreman	1	WS-11	12.85
Foreman	2	WS-8	23.84
Foreman	3	WS-6	34.34
Mobile Equipment Dispatcher	3	WG-8	28,00
Aircraft Towman	9	WG-8	86.14
Motor Vehicle Operator	2	WG-7	18.54
Fork Lift Operator	2	WG-7	18.54
Material Expediter	1	WG-6	8.86
Motor Vehicle Operator	8	WG-6	70.42
Fork Lift Operator	28	WG-5	222.50
Tractor Operator	1	WG-5	8.44
Upward Mobility Trainee	3	WG-2	19.32
Totals	63		$551.79

Total cost per year = $264,859

Total cost per month = $22,072

III. CONCLUSIONS

Conclusions will be drawn with regards to the NAS Alameda Supply Department and the NARF separately.

A. NAS ALAMEDA SUPPLY DEPARTMENT

The overall flow processes which involves NAS Supply are effective and efficient. The physical layout of the buildings matches the flow processes. This helps to avoid excessive movements and handling. For example, the bulk storage areas are near the receiving point (building 368).

Time constraints have also been considered when storing material. For example, the local (on station) customers which require a fast response time are fed from centrally located warehouses (building 8, 9, 91, and 92). Although some of the warehouses are relatively far away from some of the local customers the longest this distance is still less than 2.5 miles (See Appendix B).

There are some areas where improvements might be made. One area in which cost reductions might occur is the use of semi-trailers. The monthly equipment cost of the semi-trailer movements is $8,129 as opposed to $3443 per month for class B charges, and $951 per month for class C charges (See Table XIII). Because this is almost twice the sum of the class B and class C charges, this area should be studied more closely to determine if the service provided really warrants its cost.

A summary of the estimated total costs for both personnel and equipment are contained in Table XX. From this table another area becomes apparent. That is, the Material Division personnel costs are more than 20 times that of the equipment costs ($4.7 million to $0.2 million). This fact emphasizes the need to reduce personnel costs. One way to do this is by automating warehousing functions. Another way is by the use of less people intensive material handling equipment (i.e., automated conveyers rather than forklift trucks). Further study should reveal other alternatives.

There is also duplication between the Aviation Support and Material Divisions. Both divisions transport material from NSC Oakland on a daily basis. With further study, this duplication might be reduced without increasing the response time for the highly time constrained Aviation Support Division.

B. NAVAL AIR REWORK FACILITY

NARF's internal material distribution system can be characterized as having little control. The only record kept of where vehicles and material went was the five days of logs for this thesis. These logs showed almost 30 percent of these movements duplicated what NAS Supply already does. No routes are established for these vehicles either. Each vehicle only has a general area in which to move material; but, these areas are not written down to

TABLE XX

SUMMARY OF TOTAL COSTS FOR THE MATERIAL DISTRIBUTION SYSTEM

Estimated for the year of 1979

Activity	Quantity	Total Cost ($/yr)
NAS Alameda Supply Department		
Material Division		
Personnel Costs	287	4,727,000
Equipment Costs	105	202,816
Subtotal	392	4,929,816
Aviation Support Division		
Personnel Costs	4	64,500
Equipment Costs	7	9,416
Subtotal	11	73,916
NAS Supply Total		
Personnel	291	4,791,500
Equipment	112	212,232
Total		$ 5,003,732
MART		
Transportation Branch		
Personnel Costs	63	264,859
Equipment Costs	165	591,531
Total		856,531
TOTAL SYSTEM COST		$5,860,122

Note: Information summarized from Tables XIII, XIV, XV, XVII, XVIII, XIX.

avoid confusion, overlaps and gaps. Also, no monitoring was done by supervisors to ensure that material does not get "pigeon holed" for indefinite periods of time or that vehicles are actually moving material rather than sitting idle [9,15].

The most control found was in the material requisition process (Figure 10). Then from Table II it can be seen that this process takes an average of 157.1 hours (6.5 days) for all Issue Group requisitions to be processed. Because this process was not studied in depth, further study is needed in order to reduce this time.

From the five day study conducted for this thesis, it became apparent that the Transportation Branch is duplicating some of NAS Supply's Material Division's runs. Specifically, 30 percent of the runs made by NARF's trucks picked up material from NAS Supply warehouses (See Table XI). Because of this poor control and an annual cost of $856,000 (See Table XX), the Transportation Branch should be studied further. The possibility of having NAS Supply deliver directly to each of NARF's internal route locations should also be investigated.

APPENDIX A

LOCAL CUSTOMERS AND THEIR VOLUME

Bldg #	Activity Name	No. of Requisitions	Percent of Total
Various	NARF Alameda	83,845	76.67
Various	NAS Alameda	13,377	12.23
Moffett	NAS Moffett Field	4,793	4.38
39	Naval Air Reserve Unit	1,745	1.60
22	Marine Air Reserve Training Detachment	1,384	1.27
20	VA 303	900	0.82
20	VA 304	889	0.81
21	VAQ 208	615	0.56
40	HS 85	501	0.46
Piers	USS Coral Sea (CV-43)	452	0.41
Piers	USS Enterprise (CVN-65)	245	0.22
40	VR 55	225	0.21
Moffett	VP 91, NAS Moffett Field	116	0.11
77	Naval Weather Service Facility	80	0.07
8	Data Processing Service Center Pacific Fleet, Alameda	47	0.04
Piers	USS Ranger (CV-61)	27	0.03
1	Naval Disease Vector Ecology and Control Center	26	0.02
8	Naval Telecommunication Center	13	0.01
Oakland	Navy Regional Plant Equipment Office, Oakland	13	0.01
21	VAQ 308	12	0.01
San Francisco	Naval Regional Dental Center, San Francisco	11	0.01
Moffett	Fleet Aviation Specialized Operational Training Group Pacific Detachment Moffett	11	0.01
40	VRC-30	10	0.009
Moffett	Naval Air Maintenance Training Detachment Moffett	10	0.009
Moffett	Commander Patrol Wings Pacific	6	0.005
	NSC Oakland	5	0.005
	Total	109,363	

Requisition Volume Distribution by Month

Month	No. of Requisitions
January	8,037
February	1,793
March	96
April	41
May	14,994
June	15,547
July	12,508
August	16,746
September	13,158
October	11,505
November	11,442
December	8,469

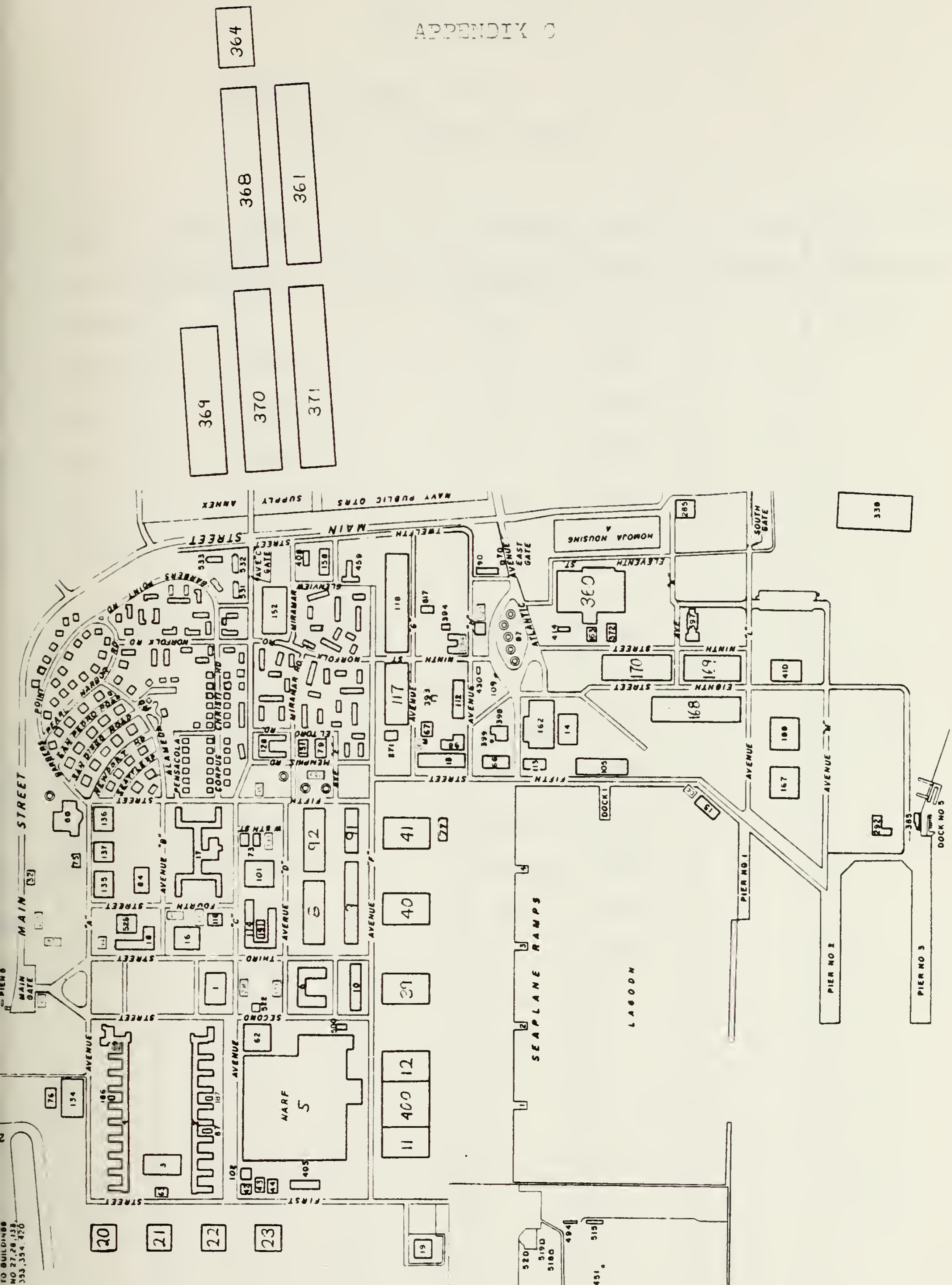
Source: NAS Alameda Demand History File.

NOTE: Because of the various time frames in filing information on the Demand History File the most recent 6 months (November to April) may not contain all of the volume of requisitions.

APPENDIX B : DISTANCE CHART

BLDG No.	5	8	9	11	12	13	18	20	21	22	23	39	40	41	67	77	91	92	117	168	169	170	360	361	364	368	369	370	371	400	Piers
5		8																													
8	0.4		9																												
9	0.5	0.1		11																											
11	0.5	0.7	0.6		12																										
12	0.3	0.6	0.4	0.2		13																									
13	0.7	0.4	0.3	0.8	0.6		18																								
18	0.5	0.8	0.6	0.8	0.6	0.9		20																							
20	0.6	1.3	1.1	0.6	0.8	1.3	0.7		21																						
21	0.5	1.2	1.0	0.5	0.7	1.2	0.8	0.1		22																					
22	0.4	1.3	0.9	0.4	0.6	1.1	0.7	0.2	0.1		23																				
23	0.3	1.1	0.8	0.3	0.5	1.0	0.8	0.3	0.2	0.1		39																			
39	0.3	0.4	0.3	0.4	0.2	0.5	0.5	0.9	0.8	0.7	0.6		40																		
40	0.5	0.3	0.2	0.5	0.3	0.4	0.5	1.0	0.9	0.8	0.7	0.2		41																	
41	0.7	0.3	0.2	0.6	0.4	0.3	0.6	1.1	1.0	0.9	0.8	0.3	0.2		67																
67	0.8	0.4	0.3	0.8	0.6	0.1	0.9	1.4	1.3	1.2	1.1	0.5	0.4	0.3		77															
77	0.9	0.5	0.2	0.6	0.4	0.3	0.6	1.1	1.0	0.9	0.8	0.3	0.2	0.1	0.3		91														
91	0.5	0.1	0.1	0.6	0.4	0.3	0.6	1.1	1.0	0.9	0.8	0.3	0.1	0.1	0.3	0.1		92													
92	0.6	0.1	0.1	0.6	0.4	0.3	0.6	1.1	1.0	0.9	0.8	0.3	0.1	0.1	0.3	0.1	0.1		117												
117	0.9	0.5	0.3	0.9	0.7	0.2	0.9	1.6	1.5	1.4	1.3	0.6	0.5	0.4	0.2	0.4	0.3	0.3		168											
168	1.3	1.1	1.0	1.6	1.4	0.5	1.5	1.9	1.8	1.7	1.6	1.1	1.0	0.9	0.5	0.9	0.8	0.8	0.6		169										
169	1.3	1.1	1.0	1.6	1.4	0.5	1.5	1.9	1.8	1.7	1.6	1.1	1.0	0.9	0.5	0.9	0.8	0.8	0.6	0.1		170									
170	1.2	1.0	0.9	1.5	1.3	0.4	1.4	1.8	1.7	1.6	1.5	1.0	0.9	0.8	0.4	0.8	0.7	0.7	0.5	0.2	0.2		360								
360	1.2	1.0	0.9	1.5	1.3	0.5	1.4	1.8	1.7	1.6	1.5	1.0	0.9	0.8	0.4	0.8	0.7	0.7	0.5	0.3	0.3	0.1		361							
361	1.5	1.5	1.5	2.0	1.8	1.2	1.3	2.1	2.0	2.0	2.1	1.7	1.6	1.5	1.1	1.5	1.4	1.4	1.1	1.9	1.9	1.8	1.8		364						
364	1.7	1.6	1.6	2.2	2.0	1.4	1.5	2.3	2.2	2.2	2.3	1.9	1.8	1.7	1.3	1.7	1.6	1.6	1.3	2.1	2.1	2.0	2.0	0.2		368					
368	1.5	1.5	1.5	2.0	1.8	1.2	1.3	2.1	2.0	2.0	2.1	1.7	1.6	1.5	1.1	1.5	1.4	1.4	1.1	1.9	1.9	1.8	1.8	0.1	0.1		369				
369	1.3	1.3	1.3	1.8	1.6	1.0	1.1	1.9	1.8	1.8	1.9	1.5	1.4	1.3	0.9	1.3	1.2	1.2	0.9	1.7	1.7	1.6	1.6	0.2	0.3	0.2		370			
370	1.3	1.3	1.3	1.8	1.6	1.0	1.1	1.9	1.8	1.8	1.9	1.5	1.4	1.3	0.9	1.3	1.2	1.2	0.9	1.7	1.7	1.6	1.6	0.1	0.3	0.1	0.1		371		
371	1.3	1.3	1.3	1.8	1.6	1.0	1.1	1.9	1.8	1.8	1.9	1.5	1.4	1.3	0.9	1.3	1.2	1.2	0.9	1.7	1.7	1.6	1.6	0.1	0.3	0.2	0.2	0.1		400	
400	0.4	0.6	0.5	0.1	0.1	0.7	0.7	0.7	0.6	0.5	0.4	0.2	0.3	0.4	0.7	0.4	0.5	0.5	0.8	1.5	1.5	1.4	1.4	1.9	2.1	1.9	1.7	1.7	1.7		Piers
Piers	1.7	1.3	1.3	1.7	1.5	0.9	1.7	2.3	2.2	2.1	2.0	1.4	1.3	1.2	1.0	1.2	1.1	1.1	1.2	0.6	0.6	0.7	0.8	2.3	2.5	2.3	2.1	2.1	2.1	1.6	

APPENDIX C



364
368
361
369
370
371
MAIN STREET
NAVY PUBLIC QTRS
SUPPLY
ANNEX
MAIN GATE
EAST GATE
SOUTH GATE
TWELFTH
ELEVENTH
NINTH STREET
EIGHTH STREET
FIFTH STREET
FOURTH STREET
THIRD STREET
SECOND STREET
FIRST STREET
AVENUE "A"
AVENUE "B"
AVENUE "C"
AVENUE "D"
AVENUE "F"
AVENUE "G"
AVENUE "H"
ATLANTIC
NORFOLK RD
MIRAMAR RD
EL TORO RD
MEMPHIS RD
ALAMEDA
PENSACOLA
CORPUS CHRISTI RD
NARF
5
400
11
12
39
40
41
92
117
118
168
169
170
360
338
SEAPLANE RAMPS
LAGOON
DOCK 1
PIER NO 1
PIER NO 2
PIER NO 3
DOCK NO 5
20
21
22
23
TO BUILDINGS NO 27,28,133, 353,354,470

Electric Truck Log

Route BLDG 400 & 5

LDG #	SIDE	DROPPED			PICKED UP			ODOMETER READING
		NUMBER	TIME	DOC (S)	NUMBER	TIME	DOC (S)	
8	North				3 TRAYS 2 BOX	1027		NONE
92	South	Ø	1030		Ø	1030		
9	East	Ø	1032		2	1034		
100	MCC E	ALL	1040		3	1043		
5	MCC A	Ø	1049		Ø	1049		
8	North		1100			1100		
				ROUTE BLDG 170 & 360				
8	North	Ø			5 BOX 2 TRAYS	1117		
92	South	Ø			2 BOX	1120		
9	East	Ø			4 BOX	1122		
170	MCC L	2 BOX 1 TRAY	1127		1 TRAY	1131		
360	West	all	1144		Ø	1145		
8	North		1155			1155		

DATA RECORD
12ND GEN 190 (12-57)

Storage Branch's Two-Ton Truck Log

SUBJECT

IDENTIFICATION 5-2-79 5/1/79

Apr. 12	OH - 0815	JL 0950	HO	0815	VS 1400	
	OH 0940	JL 1025	HO	0940	VS 1520	
	OH 1040	JL 1125	HO	1040	5-8-79	
	OH 1130	JL 1315	HO	1145	OH 0945	
	OH 1300	JL 1455	HO	1315	OH 1040	
	OH 1345	4/27/79	HO	1415	[illegible]	
	OH 1445	JL 0745	HO	0745	OH 1430	
4/13/79	JL 0900	JL 1315	JL 0845	HO	0845	OH 1130
JL 0745	JL 1030	JL 1500	JL 0940	HO	0945	OH 1320
JL 0938	JL 1310	4/24/79	JL 1050	HO	1045	OH 1420
JL 1108	JL 1500	JL 0745	JL 1315	HO	1120	OH 1445
JL 1325	4/19/79	JL 0905	JL 1450	HO	1315	5-9-79
JL 1500	JL 0745	JL 1045		HO	1425	OH 0715
4/16/79	JL 0900	JL 1125	4/30/79		5/1/79	OH 0815
JL 0745	JL 1020	JL 1315	VS 0830	5-4-79	VS 0840	OH 1030
JL 0930	JL 1315	JL 1455	VS 0940	HO	1030	OH 1120
JL 1045	JL 1455		VS 1030	OH	1120	OH 1330
JL 1125	4/20/79	4/25/79	VS 1130	OH	1300	OH 1430
JL 1315	JL 0745	VS 0830	VS 1420	OH	HO	5-10-79
JL 1505	JL 0945	VS 0935	1400	OH		HO 0715
4/17/79	JL 1035	VS 1030	[illegible]	OH	1945	HO 0745
JL 0745	JL 1315	VS 1110				HO 0940
JL 0910	JL 1515	VS 1310	5/1/79		5/7/79	HO 0940
JL 1035	4/23/79	VS 1410	VS 0830		VS 0835	HO 1035
JL 1315	JL 0745	VS 1500	[illegible] 1130		VS 0925	HO 1135
JL 1500	JL 0915	4/26/79	[illegible] 2150		VS 1030	HO 1315
4/18/79	JL 1020	JL 0745			VS 1130	HO 1415
JL 0745	JL 1125	JL 0905			VS 1310	

3-2?-79 Cut

Reg. No.	Type Vehicle or Equipment	Driver Operator	Requested By	Report To	Load or Number in Party	Time Vehicle Requested	Destination	Time Out	Time In	Total Miles Operated	Remarks
95-14812	2 Ton	May	Traffic	Storage	3 Flat		8	1029	1321		
95-14822	2 Ton	Clark	"	Storage	1 bx		8	1128	1348		
95-14781	2 Ton	Karratti	"	Gd Sea Navy	1 bx 4 Flats		3-400	1134	1300		
~~99-21307~~	~~Janis~~		"	Engineered	3 engs		168				
95-14812	2 Ton	May	"	Storage	3 Flats		92-4	1327	1539		
11-12196	Muletrain	Brown	"	Coast Guard	2 dr 6 Flats		320	1418	1434		
95-14822	2 Ton	Clark	"	Disposal	6 Flat		4	1400	1600		
~~99-26159~~	~~Jeans~~		"	Cust Sea	4 eng		12				
~~[illegible]-18131~~	~~Jeans~~		"	Navy	9 Flats		5				
95-14781	2 Ton	Karratti	"	Ship	2 eng 1 eng		San Jose	1418	1545		
[illegible]	Muletrain	Brown	"	Clamp	6 Flats		364	1503	1528		
				3-2?-79	9090						
95-14822	2 Ton	Clark	Traffic	Disposal	6 Flats		4	0742	0845		
11-12196	Muletrain	Brown	"	Storage	15 F Flats		361 370-371 W-369	0821	0855		
95-14781	2 Ton	Karratti	"	Storage Fleetman	40 6 Flats		3 Galley 67-Fleetman	0808	0931		
95-14819	2 Ton	Green	"	Storage	6 Flats		170-112	0813	0929		
~~99-18131~~	~~Jeans~~		"	Squad	15 Flats		11				
95-14822	2 Ton	Clark	"	Navy	6 Flats		338	0850	0958		
~~[illegible]-21518~~	~~Janis~~		"	Navy	3 tank 7 Flats		168 N				
95-14812	2 Ton	May	"	Storage	2 Flats		8	0850	0920		
[illegible]	Muletrain	Brown	"	Clamp	3 Flats 2 bx		364	0903	0950		
[illegible]-14819	2 Ton	Green	"	Storage	6 Flats		168-91-92-112	0915	1300		
[illegible]-14781	2 Ton	Karratti	"	Navy	2 Flats		-100	0954	1121		

Out of 36 ... "MATERIAL [illegible] OUT OF [illegible]"

4-4-29

			REQUESTED BY	REPORT TO	LOAD OR NUMBER IN PARTY	TIME VEHICLE REQUESTED	DESTINATION	TIME		TOTAL	
		DRIVER OPERATOR						OUT	IN		
95-21424	2 Ton	Christ	Traffic	Oakland	5 mail 6 Bx 2 Fl		NAS-OAB-NCC	0745	1610		
95-19826	2 Ton	Clark	"	Storage Packing	27 Flats		368D-5-400-420 117-91-9-93-13	0440	1350		
95-15837	2 Ton	Davis	"	Squad	15 Bx 24 Flat		368D-170-62 11-9-91-117-371	0745	1615		
11-12196	Milktrain	Hendricks	"	Storage	38 Flats 8 Bx 1 Tank		364-369-370-371-368D	0900	1600		
95-18812	2 Ton	May	"	Storage	26 Flats		8-368A	0715	1525		
95-21435	2 Ton	Mixon	"	Lady Storage	10 Flats		117 5-400-13-368D	0830	1500		
"	"	"	P.O.	P.O.	1 bx		18-368A	0700	0745		
95-14822	2 Ton	Brown	Traffic	Storage	8 Fl 1 bx		170-368D-5 117-7705-91	1010	1150		
			4-5-29		9096						
95-15826	2 Ton	Clark	Traffic	Storage	18 Flats		91	0800	0820		
95-19826	2 Ton	Brown	"	Packing	1 Bx 18 Flats		9-92-4-117	0915	1334		
95-15837	2 Ton	Davis	"	Squad	3 Bx 17 Flats		368DD-8 9-91-112-371	0745	1600		
11-12196	Milktrain	Hendricks	"	Storage	2 Bx 5 Flats 34		364-369-370-371-368DD	0843	1605		
95-14812	2 Ton	May	"	Storage	1 Bx 24 Flats		8-368A	0805	1555		
95-21424	2 Ton	Christ	"	Oakland	6 Mail 9 Flats		NSC-OAB-NAS	0745	1616		
95-21435	2 Ton	Mixon	4-6-29		9097						
95-21435	2 Ton	Mixon	Traffic	Storage	11 Flats		117-5-4	0835	1145		
"	"	"	P.O.	P.O.	1 bx		18-368A	0700	0745		
95-15837	2 Ton	Davis	Traffic	Squad	15 Bx 14 Flats 3 Tanks 24½ Flats		371-370 11-117-368BD-9-5	0745	1605		
11-12196	Milktrain	Hendricks	"				364-370-371-368	0835	1602		
95-21424	2 Ton	Christ	"	Oakland	5 mail 8 Flats		NSC-OAB-NAS	0745	1610		
95-15826	2 Ton	Clark	"	Storage	35 Flats		52-5 8-368A-9-13-	0830	1510		

OTHER TRAIN

93

APPENDIX D-4

VEHICLE/EQUIPMENT REQUEST AND RECORD
NAVFAC 9-11240/1 (3-68) S/N 0105-LF 004-1150
Supersedes NAVDOCKS 11240 1 (5-65)

PART A. *To be filled in by Requesting Activity.*

1. REQUESTING ACTIVITY	2. TYPE EQUIP. REQUESTED	3. WITH OPERATOR
ASD	PU	☐ YES ☒ NO

4. REPORT TO (Name, Bldg., Room)	5. PHONE
HCR #41	4404

6. REPORTING TIME		7. DESTINATION
DATE	TIME	
1-9-79	13:05	NSC ODA

8. ACCOUNTING DATA CHARGEABLE

9. SIGNATURE OF REQUESTER	10. DATE
C Rm	1-9-79

PART B. *Transportation Dept. fill in on receipt of request.*

1. REQUEST RECEIVED		2. RECEIVED BY (Dispatcher)
DATE	TIME	

PART C. DISPATCH AND USE INFORMATION

1. U.S. REGISTRATION NO.	2. EQUIP. TYPE	3. EQUIP. CODE
94-93128	PU	

4. DATE DISPATCHED	6. TIME:		7. TOTAL HOURS USED
1-9-79	OUT	13:05	
5. DATE RETURNED	6. METER READING:		8. TOTAL MILES
	OUT	87369	
10. DISPATCHER'S SIGNATURE			11. WORK CENTER

12. FUEL PURCHASED FROM OUTSIDE SOURCES:	NO. GALLONS	COST
		$

13. REMARKS (Relevant trip information and/or vehicle deficiency)

VEHICLE/EQUIPMENT REQUEST AND RECORD
NAVFAC 9-11240/1 (3-68) S/N 0105-LF-004-1150
Supersedes NAVDOCKS 11240 1 (5-65)

PART A. *To be filled in by Requesting Activity.*

1. REQUESTING ACTIVITY	2. TYPE EQUIP. REQUESTED	3. WITH OPERATOR
ASD	PU	☐ YES ☒ NO

4. REPORT TO (Name, Bldg., Room)	5. PHONE
HCR #41	4404

6. REPORTING TIME		7. DESTINATION
DATE	TIME	
1-10-79	13:20	NSC ODA

8. ACCOUNTING DATA CHARGEABLE

9. SIGNATURE OF REQUESTER	10. DATE
C Rm	1-10-79

PART B. *Transportation Dept. fill in on receipt of request.*

1. REQUEST RECEIVED		2. RECEIVED BY (Dispatcher)
DATE	TIME	

PART C. DISPATCH AND USE INFORMATION

1. U.S. REGISTRATION NO.	2. EQUIP. TYPE	3. EQUIP. CODE
94-93128	PU	

4. DATE DISPATCHED	6. TIME:		7. TOTAL HOURS USED
1-10-79	OUT	13:20	0
5. DATE RETURNED	6. METER READING:		8. TOTAL MILES
	OUT	87421	21
10. DISPATCHER'S SIGNATURE			11. WORK CENTER

12. FUEL PURCHASED FROM OUTSIDE SOURCES:	NO. GALLONS	COST
		$

13. REMARKS (Relevant trip information and/or vehicle deficiency)

DAILY VEHICLE REQUEST LOG
12KD NASA 11260/1 (REV 6-74)

Semi-Trailer log

9052

TIME REQUESTED	TIME DISPATCHED	REQUESTING ACTIVITY	REQUESTOR'S NAME	EXT.	TYPE EQUIPMENT REQUESTED	DESTINATION FROM	DESTINATION TO	DISPATCHER	DRIVER	VEHICLE NO.	TIME OUT	TIME IN
0815	0816	Traffic	Willie	2180	L/R	368C	117	Caruso				
0830	0831	Traffic	Willie	2180	L/R	368C	5	Caruso				
1116	1117	Traffic	Willie	2180	L/R	368C	170S	Caruso				
			2-22-79-			9053						
0857	0858	Squad	Nick	3517	Spot	11	364	Giles				
0905	0907	TRAFFIC	TUNNER	2919	L/R	CAEN 368-C	WARF FARM	CARUSO		97-26185		
1337	1338	Traffic	Willie	2180	L/R	368C	170	Caruso				
			2-23-79			9054						
0239	0240	Traffic	Willie	2180	L/R	365C	369	Scott				
0239	0240	Traffic	Willie	2180	L/R	365C	168D	Scott				
0258	0259	Squad	Nick	3517	Spot	11	368D	Caruso				
0804	0805	Storage	Leno	1132	Spot	9	11	Grazzini				
0856	0857	Traffic	Willie	2180	L/R	368C	170	Caruso				
0940	0942	Traffic	Willie	2180	L/R	368C	12	Caruso				
1023	1024	Traffic	Willie	2180	L/R	368C	530	Caruso				
1108	1109	Traffic	Bob	2919	L/R	368A	SLA PM	Caruso				
1150	1151	Traffic	Willie	2180	L/R	368C	530	Caruso				
1312	1318	Traffic	Leno	1132	L/R	9	11	Caruso				

DOCUMENT CONTROL REGISTER
12ND NASA 5440/4 (7-74) Aviation Support Division Log G) MACKIN 9026

SQUADRON	DOCUMENT NUMBER	NUMBER DOCUMENT CARRIED	TIME DEPARTED BLDG 8	TIME ARRIVED WAREHOUSE	WAREHOUSE NUMBER	TIME DEPARTED WAREHOUSE	TIME DELIVERED TO CUSTOMER	REMARKS
AWP	C017	8	0830		8	0830	0850	1
AWP	C018				8		0850	
AWP	C270				8		0850	1
AWP	C271				8	0830	0850	1
AWP	C272			0835	91	0845	0850	1
AWP	C273				91		0850	1
AWP	C274				91		0850	1
AWP	C275		0830	0835	91	0845	0850	1
AWP	C260	8	0950		8		1010	
AWP	C254				8		1010	
AWP	C023				8		1010	1
AWP	C003				8		1010	
AWP	C008				8		1010	
PEB	E873				8	0950	1015	
AWP	C001			0955	117	1005	1010	1
AWP	C004		0950	0955	117	1005	N/S	8
VAQ208	G1449	4	1050	1055	701	1100	1120	4
HMH-1	G070			1055	701	1100	1120	1
VA304	G318			1105	711	1110	1125	1
HS85	G629		1050	1105	711	1110	1112	2
VAQ208	G450	4	1135		8	1135	1140	
VAQ208	G451				8		1140	1
VAQ208	G440				8		1140	
AWP	C025		1135		8	1135	1150	
AWP	C100	2	1310		8	1310		1
AWP	C029		1310	1315	117	1320		1

APPENDIX D-8

NARF Log

Type Vehicle : TAYLOR-DUNN Date : OCT 23, 79

In BLDG : 162 [illegible] : A-B.M STOREROOM Time :

ROUTE LOCATION	CLOCK TIME ARRIVED	CLOCK TIME DEPARTED	Number Off Loaded	[illegible]	[illegible]
73	0730	0738	30		
60	0739	0743	9		
69	0743	0751	11		
55	0800	0807	12		
82	0807	0816	6		
81	0819	0823	11		
83	0824	0826	3		
89	0830	0834	2		
68	0838	0845	35		
Pic-x	0845	0854	60		
70	0901	0911	10		
63	0915	0929	3		
59	0931	0935	4		
72	0940	0945	12		
66	0956	0958	4		
53	10:00	1006	19		
BLDG. 14. 58	1014	1022	5		
BLDG. 162. 77	1028	1036	40		
BLDG. 66. 79	1047	1055	35		
BLDG. 398. 74	1103	1116	70		
BLDG. 113 Pic-x	1126	1128	10		
BLDG. 163. H3, H7 LEAN-TO			15		

APPENDIX E

Copies of Forms

DELIVERY

DING ROOM DATE

OF (BOX, PLT, CTN, ETC.)

ASA 4613/24 (REV. 2-67)

TO

FROM

PRIORITY (CHECK ONE)	
	RED HOT WALK THROUGH NORS, ETC.
	HOT URGENT LINE, ETC.
	ROUTINE SCHEDULE

DISPATCH INSTRUCTIONS 12ND NARFA 4615/2 (REV. 9-73)

☆ U.S. GPO: 1977-791-334

APPENDIX F

SQUADRONS ASSIGNMENT

Delivery section 368-C Annex, Hangers and Squadrons, deliveries. Two drivers assigned daily.

Pickup materials 368-A floor and security cage "Signature material."

Pickup materials 368-C Delivery section.

Pickup materials at buildings 369-370-371-361, storage.

Pickup BLK material building 13 storage.

Deliver to the following hangers twice daily AM and PM.

VA 303 -	HGR 20	RM 137	phone:	3557-3505
VA 304 -	HGR 20	RM 143	phone:	3697-3905
CVWR 30 -	HGR 20		phone:	3982
VAQ 208 -	HGR 21	RM 139	phone:	2373
VAQ 308 -	HGR 21	RM 145	phone:	4620-2373
NARU -	HGR 21			
PRE - X	HGR 21	RM 132		
Tool Room	HGR 21	RM 132		
NARTD	HGR 22			
A47/CH53A	HGR 22			

Operations Department Hanger 23

HS-85	HGR 39	RM 137	phone:	3257/2010
TA-4J	HGR 39	RM 150		
TA-3B	HGR 39	RM 150		
VR55	HGR 40	RM 145		
AIMD	HGR 41			
Supply Support	HGR 41		phone:	4403
PRE- X Bins	HGR 41			

Ships GSE DETS. Building 67

USS Coral Sea	(COD Aircraft)	HGR 23
USS Enterprise	(COD Aircraft)	HGR 23

SDC RUN

Pick up materials from 9 - 91 - 92 - 8

Haul to NARF 5 - 11 - 12 - 400 - and BLDGS 130 - HGRS - Barracks - ADM - 18 - 16 - 30 - etc.

Request help when needed to handle multi-pack carton etc.

Hourly pickup & delivery.

NARF - SDC - REGULAR - MISC.

Haul material from ---
368-C to NARF - 5-11-12-400-170-338-360 HOURLY

At 2:00 go to HGR 11 NARF's return material area. Give assigned driver in that area a hand.

Haul misc. to 8-91-92-Piers-117-13-etc. When material is slow coming in for regular assignment.

Also fill in when other assigned driver(s) are off or on leave, etc.

RETURN MATERIAL FROM NARF INTO SYSTEM

Material from HGR 11 west side to packing 368-D -- 364 - 91 - 92 - 9 - 117 - Clamp 364W - 371E. - etc.

Hourly deliveries or soon as material is worked for removal.

MAIL PARCEL POST

Each A.M. 0930 pickup 2 mailboxes at 368-A (EMPTU) deliver to post office, Bldg. 18 - sign for parcel and fill boxes. Bring back to 368-A have workers at 368-A sign for parcels. Keep one copy bring to 368-C office for file.

Repeat above operation each P.M. 2:30..

SDC - CLAMP - NARF

Haul materials from -----
368-C to NARF 5 - 11 - 12 - 400 - 360 - 170 - 338 - NARF FARM

Return clamp from HGR 11 to 361 - 371 ---- A.M. and P.M.
10:30 1:30

Hourly----continued----

CONFIDENTIAL & MISCELLANEOUS RUN

Confidential material and missel from 368-A cage - 368-B cage to Bldg. 168 cage 117 cage and bldg's and piers (to ships) on station.

Pickup and deliver materials off station to NSC, Oakland Airport - San Francisco Airport & City - Stockton - Travis and other Bay Area cities and shipyards etc.

Give & receive general receipts for materials pickup and delivered.

Continuous ----------

MISC. RUN

Pick ups at:

BLDG. 368-C and 369 and other buildings as necessary

Deliveries to:

Bldg. 1 - Administration

Bldg. 2 - Ship service - IRD training - self help

Bldg. 3 - Wings

Bldg. 4 - Wings

Bldg. 6 - P.W.C. parts room

Bldg. 10 - P.W.C. power house

Bldg. 16 - Dispensary

Bldg. 18 - Theater

Bldg. 19 - Operation Tower

Bldg. 30 - Main gate security office

Bldg. 35 - Radio shack

Bldg. 62 - IRD

Bldg. 114 - P.W. Work shop stores

Bldg. 130 - D.V.C.

Bldg. 354 - CBU 409

Bldg. 42 - Ordnance

Misc. Bldg. Etc.

Bldg. 77 - Fleet weather - Air Ops

Piers - 2 - 3 to ships in port

DELIVERIES AND PICKUPS HOURLY

Also pick up and deliver typewriters & adding machines to Bldg 114 for repair and return to proper destination.

BUILDINGS 8-9-91-92-117-RUN

PICK UP & DELIVER POINTS

P/U Bldg. 368-A "Gray Boxes" going to Bldg. 8 every hour - Return EMPTIES.

P/U Material in 368-C delivery section going to Bldg.'s 8-9-91-92

P/U Material in 368-A going to 117

P/U Impress fund cashier twice weekly take to Bldg. 1 & return

P/U Any materials coming from 8-9-91-92-117 coming to 368 Annex

Continued hourly ----------

GROUP 2 & 3's ETC.

Materials from 8 - 9 - 91 - 92 - 117 - 13 - 170 to packing 368-D

Continued hourly ----------

MAIL RUN

Pick up mail & keys Bldg. 368D.

Pick up mail Bldg. 368-D, 368-A office, 368-A Mezz., 364 clamp 371-E walley off.

Pick up mail Bldg. 370-E off., 371-E off., 361-W off., 364 clamp.

Pick up mail & keys Bldg. 117 off., 13 off.

Pick up mail Bldg. 168 fuel br., 170 off.

Pick up mail & keys engine shed

Pick up mail Bldg. 400, 5-A

Deliver all keys Bldg. 8 1st deck Rampateria side.

Deliver & pick up mail 2nd deck by freight elv. Bldg. 8 & 3rd deck, 370-W off., 370-E off., 371-E off., 361-W off., 361-E off., 368-C off., 361 security cage east, 368-A Mezz. & off., 364 clamp

Deliver & pick up mail Bldg. 369-E off., 117 off., 13 off., 168 fuel br., area 170 off., engine shed, Bldg., 8 3rd deck mail room

Pick up & deliver mail Bldg., 370-W off., 370-E off., 361-W off., 368-D off., 368-C off., 361 security cage east, 368-A off., & Mezz., 364 clamp

Pick up & deliver mail Bldg. 369-E off., 117 off., 13 off., 168 fuel br., 170 off., engine shed, 400, 5-A

Deliver & pick up mail Bldg. 8 3rd deck mail room, 370-W off., 371-E off., 368-D off., 368-C off., 361 east cage, 368-A off., & Mezz., 364 clamp

Deliver & pick up mail Bldg. 369-E off., 117 off., 13 off., 168 fuel br. engine lot, (ETR Report), 170 off.

Deliver & pick up mail & ETR Report

Deliver & pick up mail Bldg. 8 3rd deck

Deliver mail Bldg. 370-W, 370-E, 371-E, 361-W, 368-D, 368-C, 361 cage east, 368-A

Deliver mail and get ETR Report signed by Ardell or Capt. Moore 368-A Mezz.

Deliver mail & reports Bldg. 8 (ETR Report to Bldg. 8 3rd deck to teletype, give to TAM)

1 trip daily Bldg. 8 mail room to Bldg. 292 rigging loft, if there is mail to be delivered - (no pick up)

NSC - P M B - RUN

Pick up material from 368-C & mail 368-A Mezz. Also material 368-E.

Pick up mail NAS Bldg. 8 1st deck Comptroller Office and deliver to Oakland Army Base Bldg. 796 rm 122.

Pick up forms and cards Bldg. 8 3rd deck.

Deliver material to Bldg. 212, etc. Ship material to Bldg. 341.

Deliver mail and pick up mail Bldg. 502.

Deliver & pick up mail Bldg. 311 - 4th floor.

Deliver forms, cards, and documents to 2nd deck B-311 and pick up documents for material pick up, commodities, fuel, grese, lumber and stock control, also located on 2nd deck B-311.

Take documents to Bldg. 312, (Oak Matic) 1st deck, pick up materials the rest of the pick ups will be written on form as to what Bldg.

(1 - RUN A.M.) (1 - RUN P.M.)

----------Deliveries and pick ups hourly----------

Also pick up material at 368-E Deliver to NSC Oakland Bldg.'s 341-331.

APPENDIX G

NARF'S INTERNAL ROUTE LOCATIONS
December 10, 1976

Shop	Title	Organization Designator	Route Location	Building	Material Control Center
10000	Administrative Services	C2		5A	A
20000	Management Controls	C3		5A	A
21100	Organization and Directives	B7		9-West end	A
30000	Aeronautical Engineering	C4		5A	A
34000	Materials Engineering	C5	C7	44	A
34200	Chemical Engineering	C6	C8	42	A
35200	Engineering Data/Technical Library	C7		5A	A
40000	Quality and Reliability Assurance	D2		5A	A
50000	Production Planning & Control	D3		5A	A
52240	Aircraft Logs & Records	D7	K2	HGR 11	F
52531	Change Kits	D4	51	5A	A
52721	PMO Breakdown (53811)	D5	25	5	A
52721	PMO Bins	D6	25	5	A
52721	Metal Staging Area	D8	B9	5	A
52721	Metal Staging Area	D9	E5	5A	A
53400	Instrument/Electric	B6		400	F
53500	Aircraft Parts	B3		5	A
53600	Engines	B4		360	L
53620	GSE & Miscellaneous Equip	B5		5A	A

Ref: 23

*53820	NIP Store	EA		5A	A
*53820	NIP Store	EM		170M	L
*53820	NIP Store	EP		261	A
*53820	NIP Store	ER		5	A
53821	NIP Store	BA		5A	A
53820		BM	80	170N	L
53821		BR		5	A
53821		BP		261	A
53821		BF	J2	FARM	A
53821	Office Supplies	B2		5A	A
53821	Shop Stock	A2		5A	A
		A3		5A	A
		A4		5A	A
		A5		5A	A
		F2		400	F
		F3		400	F
		F4		400	F
		F5		400	F
53820		L2		360	L
		L3		360	L
		L4		360	L
		L5		530	L
		M2	80	170N	L
		M3	80	170N	L

*NOTE: To be used at a later date for Customer Furnished Material.

		M4	80	170N	L
		M5	80	170N	L
6000	Production Engineering	H2		5	A
62100	Aircraft Analysis	J2	J1	338	A
62200	Engine & Accessary Analysis	J3	J1	338	L
62300	Accessories Analysis	J4	J1	338	A
63000	Methods & Standards	J5		5	A
64000	Facilities & Equipment Engineering	J6	J1	338	A
64200	Facilities Design	H5	J1	338	A
64311	Central Receiving	J7	J1	338	A
65020	Plant Services	N2	J1	338	A
65110	Mechanical Maintenance & Manufacturing	N3	D7	5	A
65120	Electrical Maintenance & Manufacturing	N4	D7	5	A
65130	Paint & Custom Manufacturing	N5	J2	Farm	A
65133	MMF Reconfiguration Custom Manufacturing	N6	F3	HGR 12	F
65140	Janitorial & Salvage	N7	8E	5A	A
65210	Mechanical Maintenance & Manufacturing	H3	J3	163	L
65220	Tool Services	H6	B7	5	A
65230	Electrical Maintenance & Manufacturing	H7	J3	163	L
66000	Metrology Standards	H8	C6	5	A
67000	ATE Engineering	H4		62	A
80000	Flight Test	Q3	HGR 11	HGR 11	F
	Optometrist	Q4		5A	A
Supply Fuel Branch		Q5		HGR 11	F

Fuel Branch
used by Section 93230

SHOP	PCC	ORGANIZATION DESIGNATOR	ROUTE LOCATION	BUILDING	MATERIAL CONTROL CENTER
*93000	51300	E3		5	A
93100	51310	G2	B2	5	A
93100	51310	G5	B5	5	A
93100	51310	G8	D1	5	A
93100	51310	G9	D1	5	A
93100	51310	K2	D6	5	A
93100	51310	K7	5B	5	A
93100	51310	R6	D1	5	A
93100	51310	R8	A4	5	A
93100	51320	G3	B6	5	A
93100	51320	K3	D2	5	A
93100	51320	K4	D3	5	A
93100	51320	K5	D4	5	A
93100	51320	K6	A2	5	A
93100	51320	R7	C5	5	A
93200	51320	G4	E4	5	A
93200	51320	G6	E4	5	A
93200	51320	G7	C2	5	A
93200	51320	K8	H1	410	L
93200	51320	K9	C3	5	A
93200	51320	R2	E2	5	A
93200	51320	R3	G1	HGR 11	F
93200	51320	R4	M1	167	L
93200	51320	R5	B4	5	A
93200	51320	R9	F1	HGT 12	F
93224	51322	W6	G3	113	L
*94000	51400	E4		400/530	F/L
94100	51412	U2	41	400	F
94100	51413	U3	41	400	F
94100	51411	U4	41	400	F

*NOTE: To be used at a later date for Customer Furnished Material.

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